OPERATING SUMMARY

CHATHAM

water pollution control plant

1967

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Local Advisory Committee,
City of Chatham.

Gentlemen:

We are pleased to submit to you the 1967 Operating Summary for the Chatham Water Pollution Control Plant, OWRC Project No. 2-0102-62.

It is hoped that our joint participation in efforts to combat water pollution will have even more success in the coming year.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

TELEPHONE 365-

J. A. VANCE, LL.D.
CHAIRMAN
J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER
W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am happy to present you with the 1967 Operating Summary for the Chatham Water Pollution Control Plant, OWRC Project No. 2-0102-62.

The report offers a concise summary of operating data for the year and comparisons with previous years where these are applicable and significant.

Yours very truly,

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.

CONTENTS

CHATHAM

water pollution control plant

operated for

THE CITY OF CHATHAM

by the

ONTARIO WATER RESOURCES COMMISSION

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DIVISION OF PLANT OPERATIONS

DIRECTOR: D. A. McTavish

Assistant Director: C. W. Perry
Regional Supervisor: P. J. Osmond
Operations Engineer: R. E. Brown

801 Bay Street Toronto 5

'67 REVIEW

This report gives in detail significant data on the operation of the various treatment units at the Chatham Water Pollution Control Plant during its second year of operation.

The operating cost for the year was $124,134.09 for a cost of $107.93 per million gallons or 4 cents per pound of BOD removed.

The average treated flow of 3.15 MGD, was 70% of the design capacity. During the peak month of December, the average daily flow was 4.30 MGD or 95.5 percent of design.

A raw sewage having an average strength of 265 ppm BOD and 226 ppm suspended solids was treated. Good percentage removals of BOD and SS were obtained. A total of 1425.8 tons of BOD and 1202.9 tons of SS were removed. A total of 7.517 million gallons of raw sludge was treated in the digesters, and the digested sludge was disposed of by tank truck. Proper chlorination of the final effluent was maintained all year.

Construction was nearly completed on a six-cell aerated lagoon system built to treat the seasonal wastes from the City's canning industries.

PROJECT COSTS

NET CAPITAL COST (Estimated)	$5,117,919.04
DEDUCT - Portion Financed by CMHC (Estimated)	3,502,988.83
Long Term Debt to OWRC	$1,614,930.21
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	$ 67,097.34
Net Operating	$ 124,134.09
Debt Retirement	30,555.00
Reserve	12,923.00
Interest Charged	99,349.61
TOTAL	$ 266,961.70

RESERVE ACCOUNT

Balance at January 1, 1967	$ 16,566.56
Deposited by Municipality	12,923.00
Interest Earned	1,237.41
	$ 30,726.97
Less Expenditures	-
Balance at December 31, 1967	$ 30,726.97

RESERVE FUND FOR PUMPING STATIONS OPERATED UNDER SPECIAL OPERATING AGREEMENT

BILLINGS

Reserve	$360.00

RESERVE ACCOUNT

Deposited by Municipality	$360.00
Interest Earned	7.80
	$367.80
Less Expenditures	-
Balance at December 31, 1967	$367.80

MONTHLY OPERATING COSTS

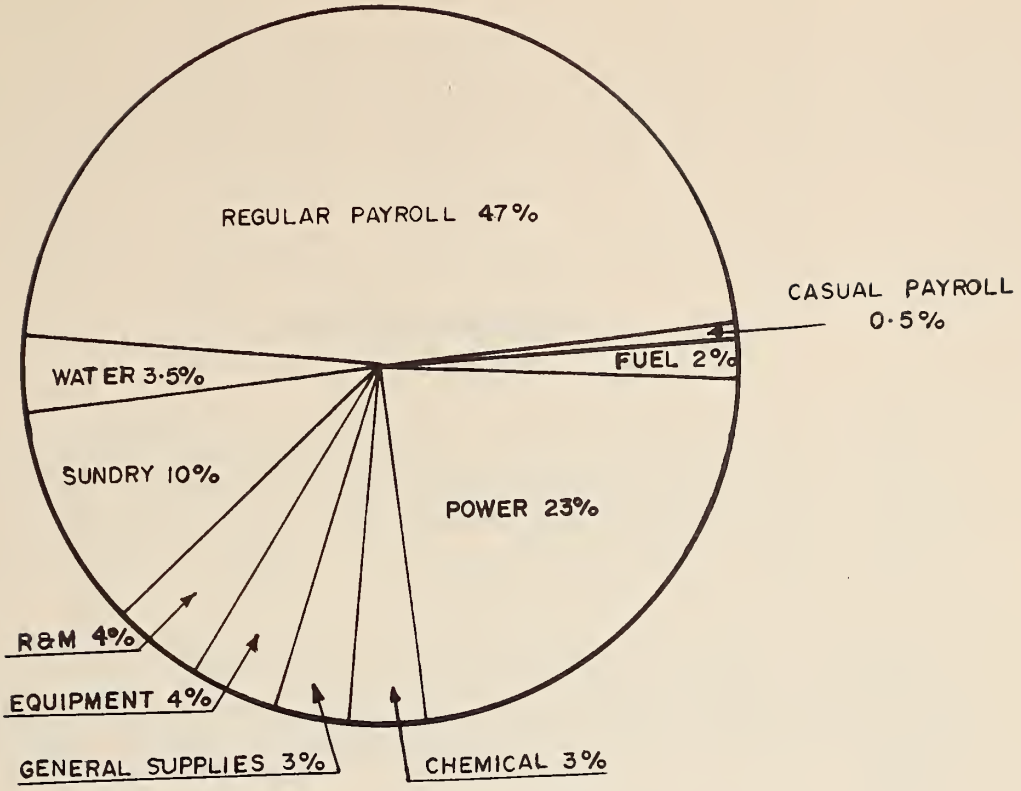
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	*SUNDRY	WATER
JAN	5,475.21	3,827.19		348.07	123.95		135.35	223.83	352.07	464.75	
FEB	8,204.38	3,827.23		395.85	2131.40		123.72	148.41	627.01	397.86	552.90
MARCH	11,353.41	6,524.38		326.69	2080.12		375.27	(434.73)	858.21	747.37	876.10
APRIL	8,125.35	4,524.85		251.17	2022.91		482.48	536.18	85.98	221.78	
MAY	8,291.42	4,896.09		160.63	1938.56		321.68		366.27	608.19	
JUNE	9,267.64	4,479.42		190.84	2047.90		345.40	335.97	563.37	624.04	680.70
JULY	10,879.80	4,633.27	334.09	79.50	2374.94	1955.10	233.96	180.24	336.42	752.28	
AUG	8,342.48	4,600.34	212.94	49.41	2271.32		137.70	109.20	95.97	865.60	
SEPT	11,288.00	6,973.73	141.68	102.78	2515.80		224.60	419.57	473.77	46.73	389.34
OCT	11,680.20	4,696.00		101.54	2136.50	558.60	724.40	257.63	680.92	1914.27	610.28
NOV	13,527.57	4,712.87		78.07	2714.97	977.55	479.87	778.82	269.95	2752.45	763.02
DEC	17,698.63	4,731.65		35.02	6130.91	279.30	384.21	2255.46	448.85	3098.61	334.62
TOTAL	124,134.09	58,427.02	688.71	2119.57	28489.28	3770.55	3968.64	4810.58	5158.85	12493.93	4206.96

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $5,806.08
BRACKETS INDICATE CREDIT

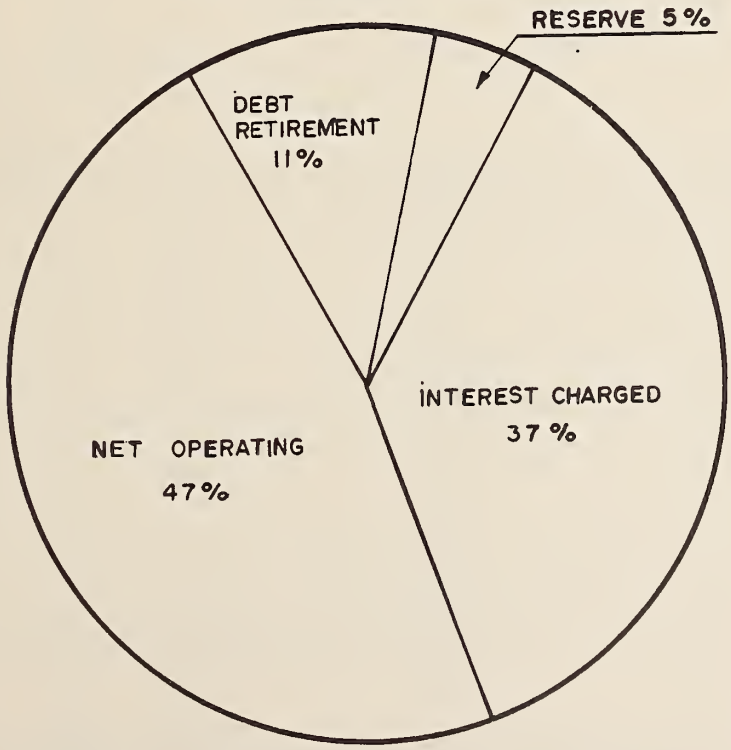
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1966	717.082	$ 89,625.37	$124.99	5 CENTS
1967	1150.150	124,134.09	107.93	4 CENTS

1967 OPERATING COSTS



TOTAL ANNUAL COST

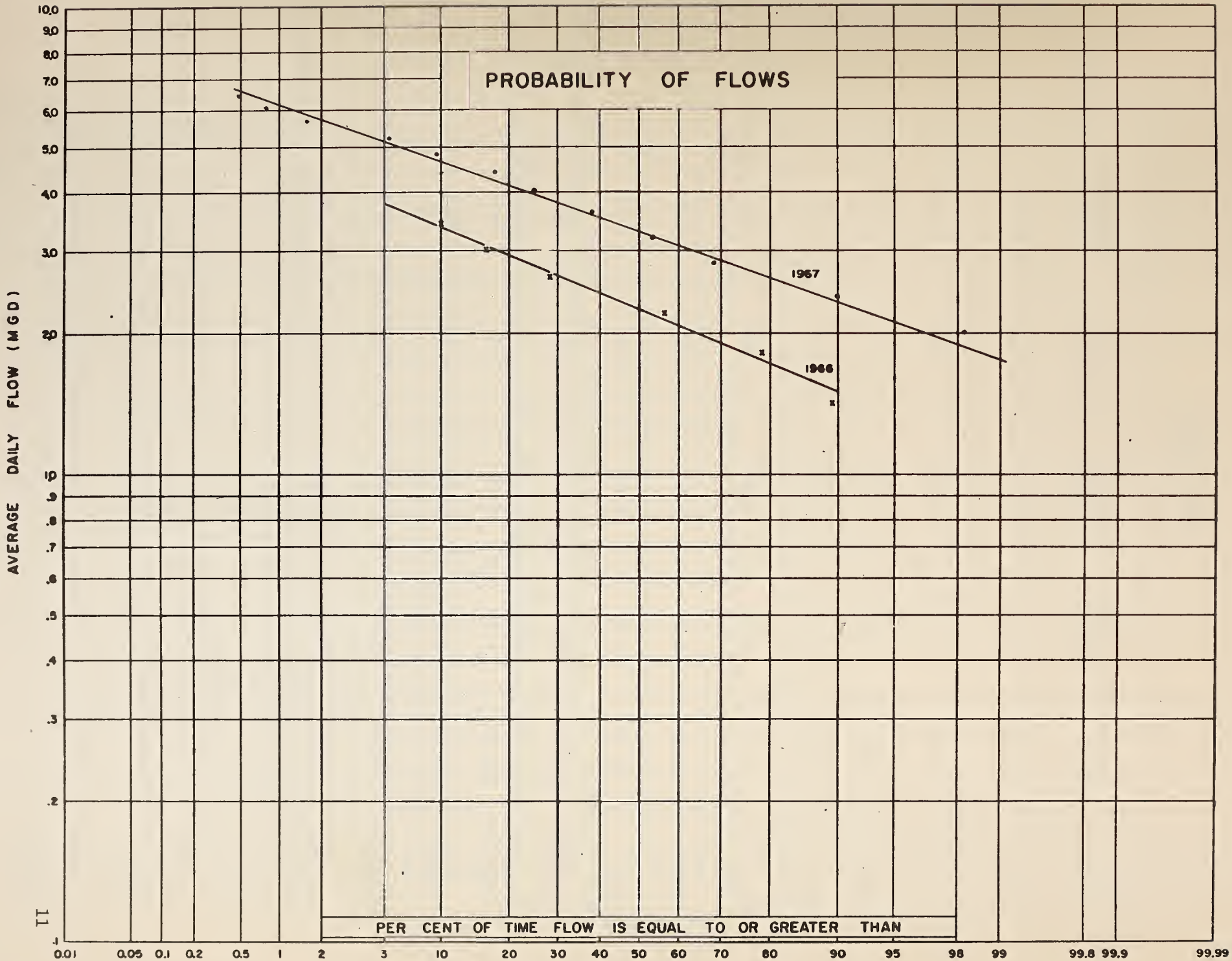


Process Data

A total of 1150.15 million gallons of sewage was treated at the plant in 1967. The average daily flow of 3.15 million gallons represents approximately 70% of the plant hydraulic capacity. The maximum day flow for the year, 6.10 million gallons occurred in December and represents 135% of design capacity. The maximum flow rate recorded at the plant was 16.4 MGD during the month of November.

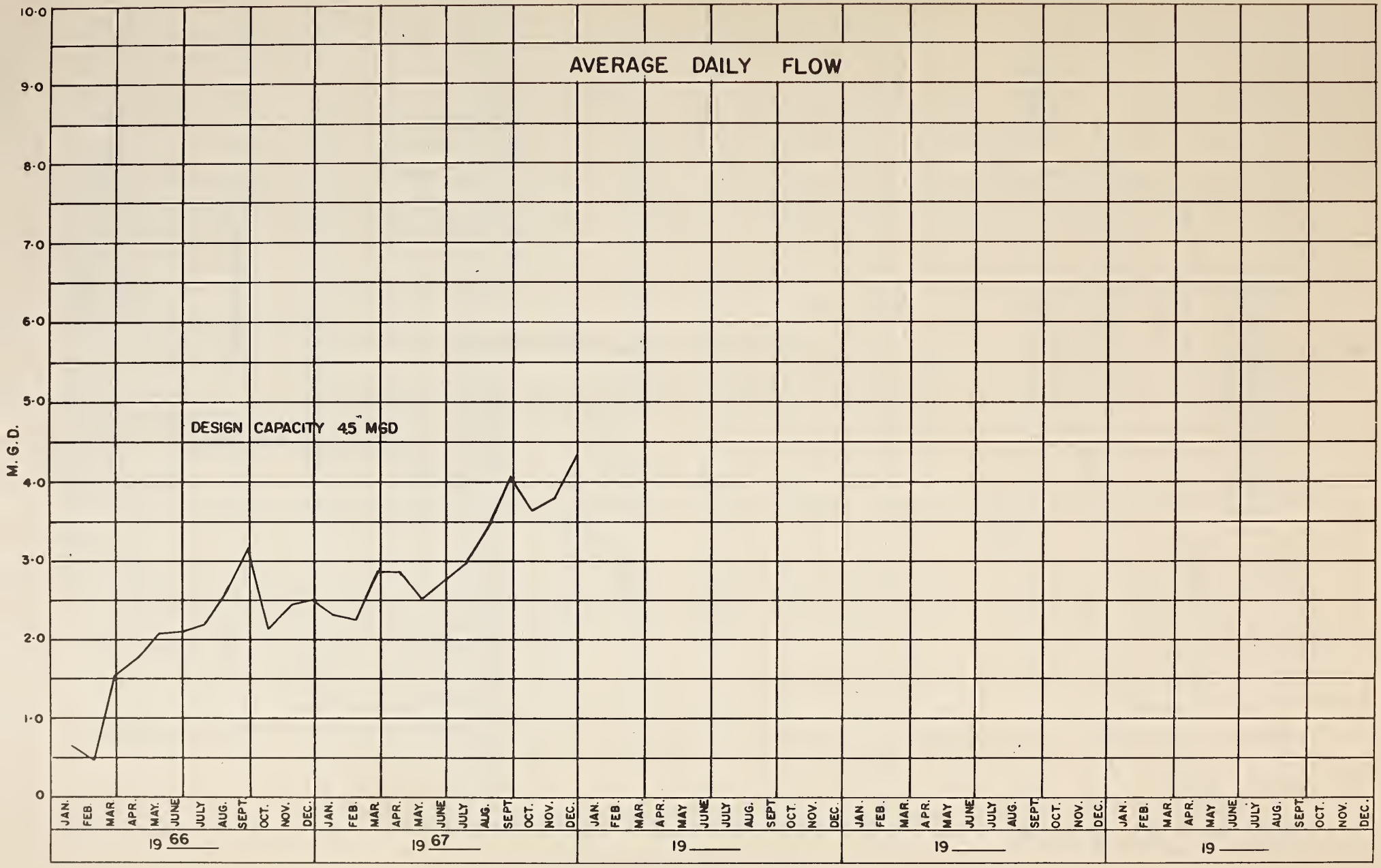
During the months of September and October, approximately 2.0 MGD of waste from Libby's tomato pack was received at the plant and during the last three months of the year, wastes effluent from the Canadian and Dominion Sugar Companies treatment lagoon was added to the plant influent.

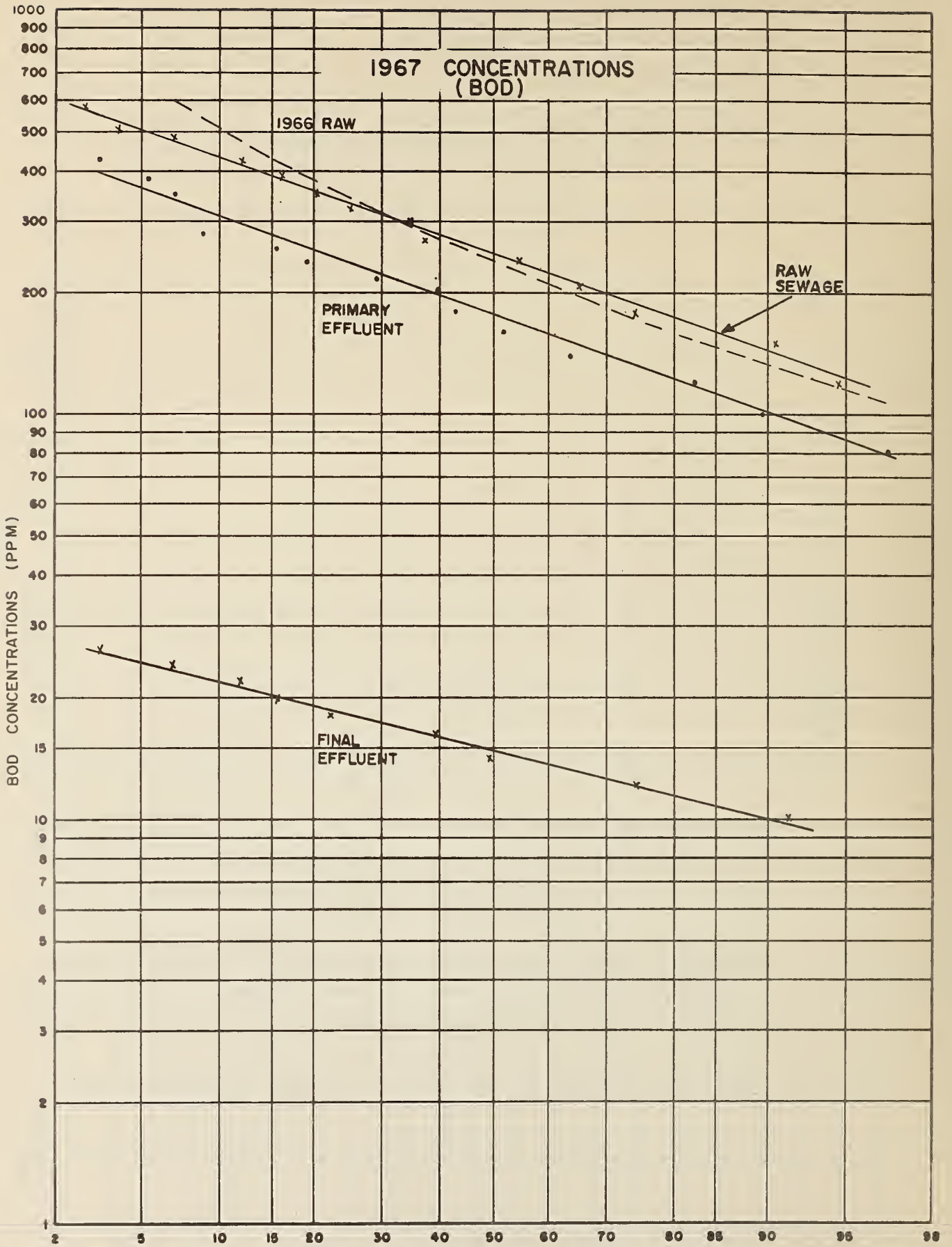
From the probability graph, it can be seen that during 1967 the design hydraulic capacity of the plant was exceeded about 10% of the time.

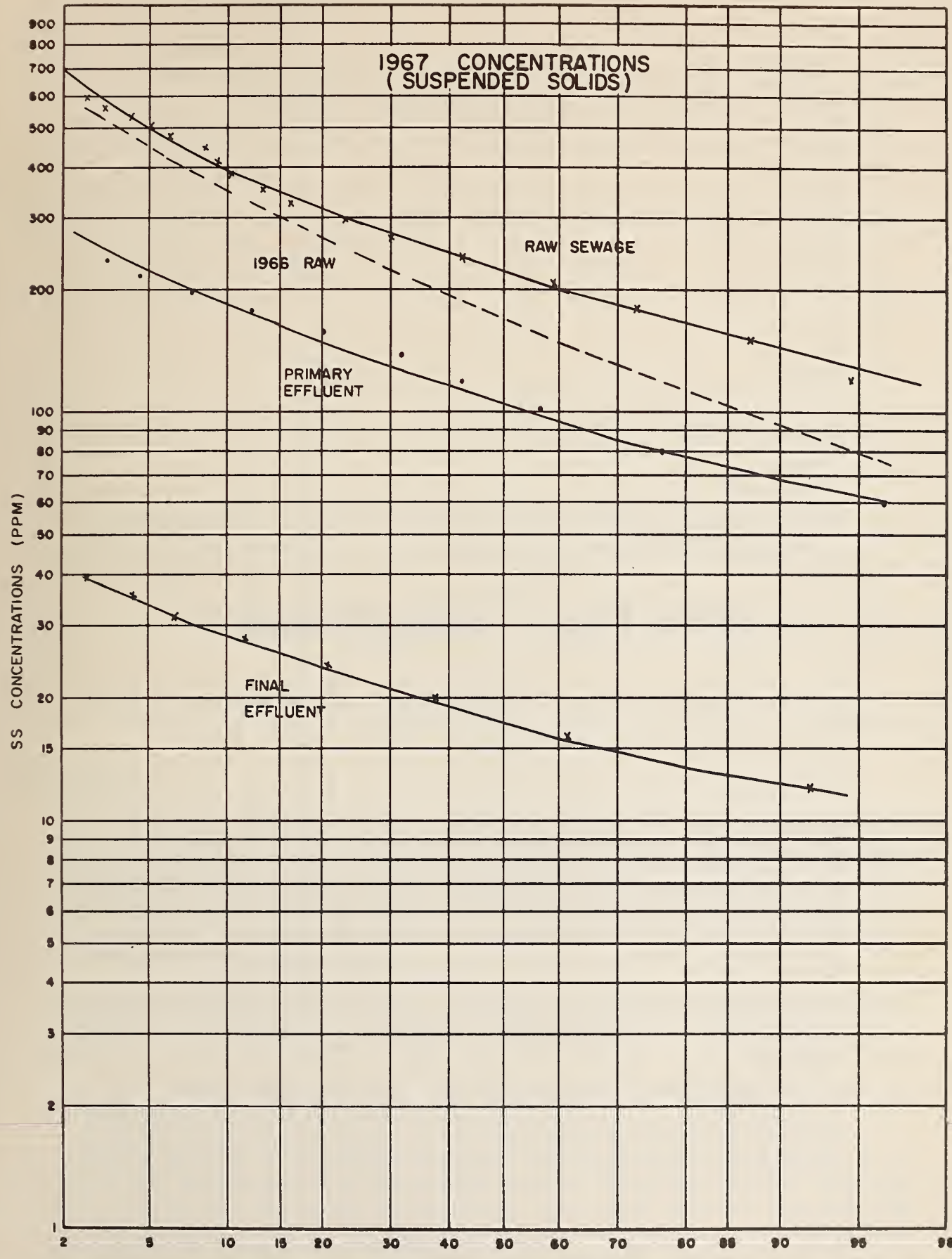

PROBABILITY OF FLOWS
AVERAGE DAILY FLOW (MGD)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
1967
1966
PER CENT OF TIME FLOW IS EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
3
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99

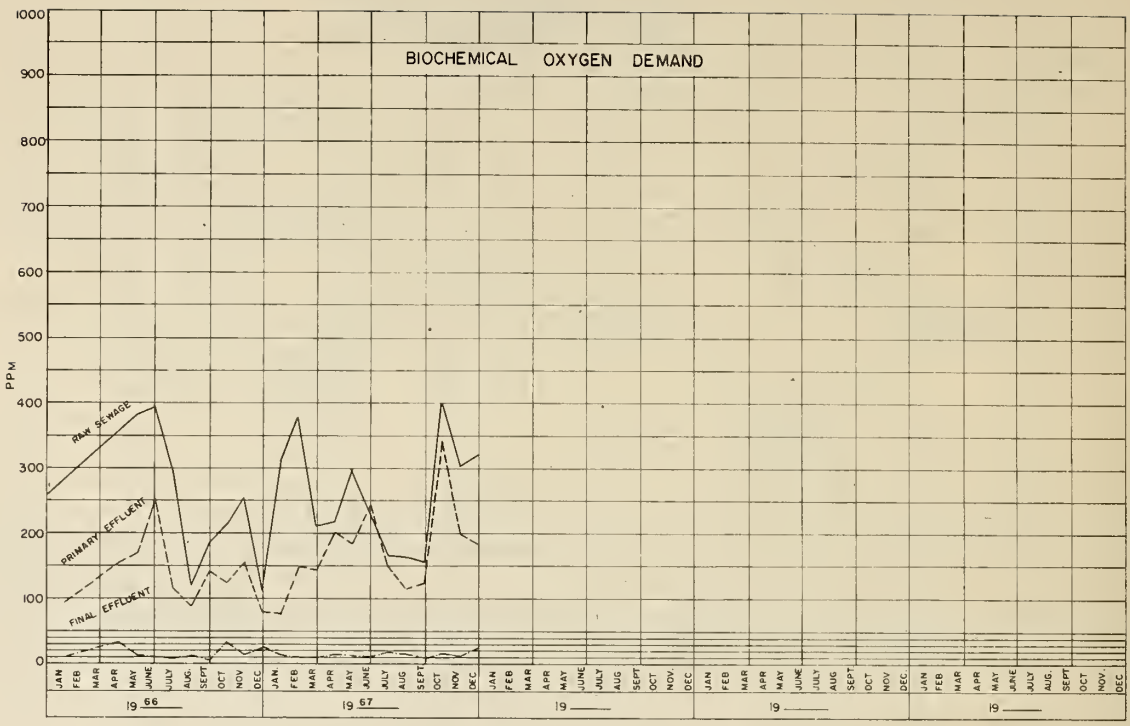
FLOW DATA

Month	Total Flow (MG)	Avg. Daily Flow (MGD)	Max. Daily Flow (MG)	Min Daily Flow (MG)	Max. Rate (MGD)	Min. Rate (MGD)
January	71.60	2.30	3.30	1.70	13.0	0
February	63.10	2.25	3.00	1.50	9.9	0
March	88.65	2.86	3.90	1.75	9.6	1.1
April	85.60	2.85	4.20	1.30	10.2	0
May	77.70	2.51	3.20	1.30	10.4	0
June	82.00	2.73	3.40	1.50	13.0	0
July	92.10	2.97	3.80	2.30	15.4	.6
August	106.50	3.44	4.50	2.10	10.8	1.3
September	122.30	4.08	5.40	1.90	10.0	1.1
October	113.40	3.65	5.30	2.50	12.8	1.1
November	114.00	3.80	5.40	2.80	16.4	0
December	133.20	4.30	6.10	2.90	12.1	.2
Total	1150.15	-	-	-	-	-
Average	95.84	3.15	-	-	-	-

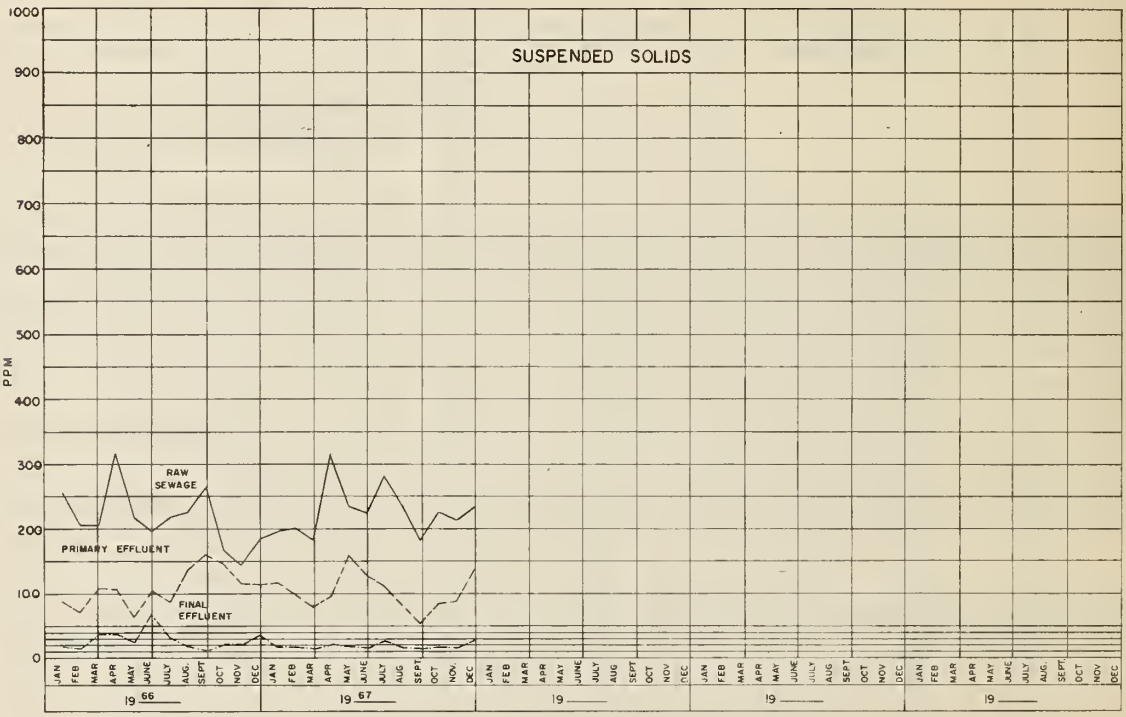

AVERAGE DAILY FLOW
DESIGN CAPACITY 4.5 MGD
M.G.D.
10·0
9·0
8·0
7·0
6·0
5·0
4·0
3·0
2·0
1·0
0
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 66
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 67
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 ____
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 ____
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 ____


1967 CONCENTRATIONS
(BOD)
1966 RAW
RAW
SEWAGE
PRIMARY
EFFLUENT
FINAL
EFFLUENT
BOD CONCENTRATIONS (PPM)
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
% OF SAMPLES EQUAL TO OR GREATER THAN


1967 CONCENTRATIONS
(SUSPENDED SOLIDS)
RAW SEWAGE
1966 RAW
PRIMARY
EFFLUENT
FINAL
EFFLUENT
SS CONCENTRATIONS (PPM)
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
% OF SAMPLES EQUAL TO OR GREATER THAN



MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	311	13.4	95.7	106.54	196	18	90.8	63.72	95
FEB.	380	11	97.1	116.42	200	15	92.5	58.37	118
MAR.	211	11	94.8	88.65	181	14	92.3	74.02	156
APR.	220	14	93.6	88.17	313	19	93.9	125.83	526
MAY	300	13	95.7	111.50	234	16	93.2	84.69	216
JUNE	231	12	94.8	89.79	222	12	94.6	86.10	412
JULY	169	19	88.8	69.08	281	23	91.8	118.81	360
AUG.	166	17	89.8	79.34	237	15	93.7	118.22	730
SEPT.	159	11	93.1	90.50	181	12	93.4	103.34	459
OCT.	401	17	95.8	217.73	227	16	93.0	119.64	540
NOV.	307	13	95.8	167.58	211	14	93.4	112.29	276
DEC.	323	22	93.2	200.47	231	24	89.6	137.86	264
TOTAL	-	-	-	1425.77	-	-	-	1202.89	4152
AVG.	265	14	94.0	118.81	226	17	92.7	100.24	346

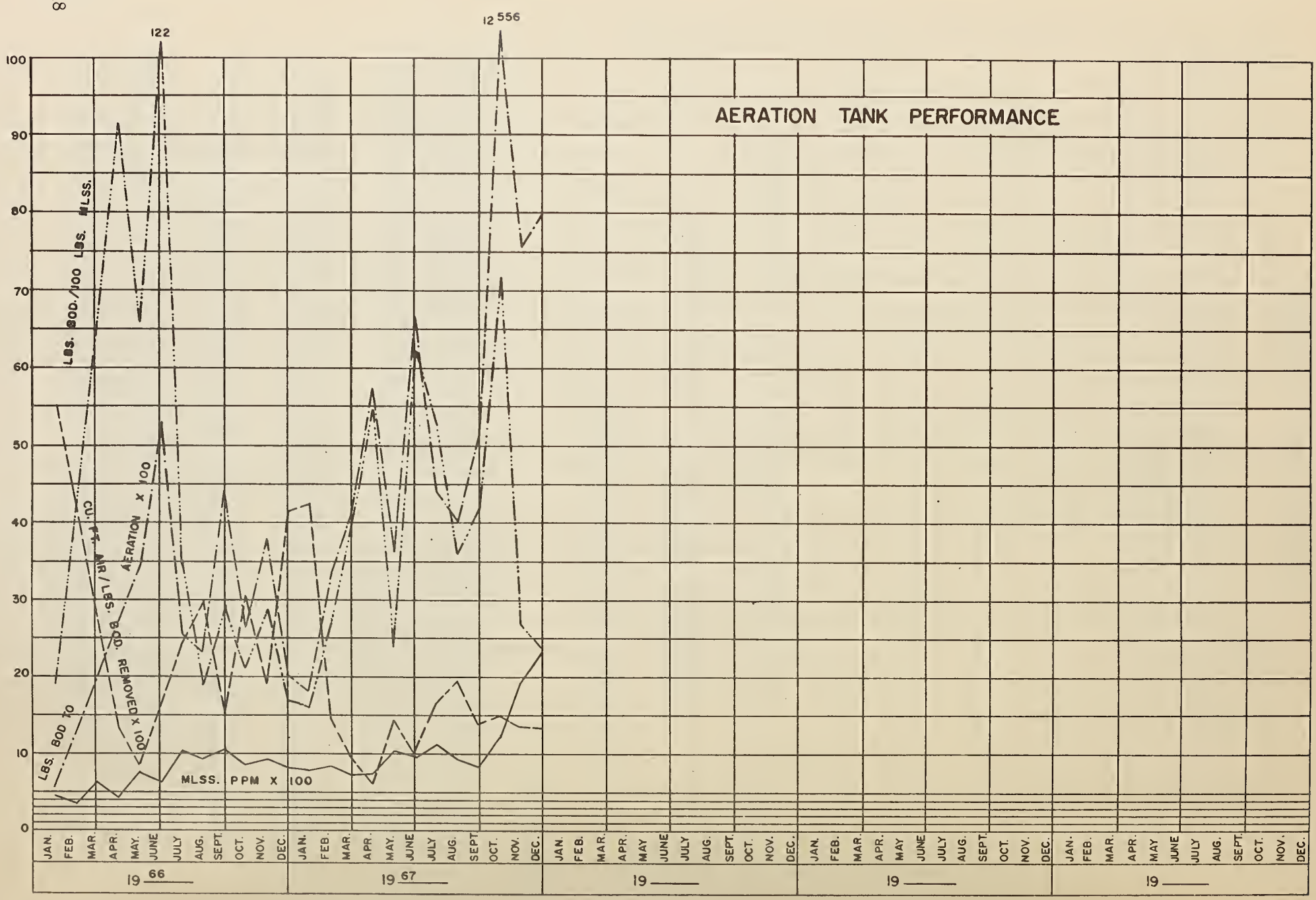
COMMENTS

The average raw sewage strengths in 1967 were 265 ppm BOD and 226 ppm SS. The average strengths of the final effluent were 14 ppm BOD and 17 ppm SS and represent removal efficiencies of 94.0 and 92.7% respectively. The final effluent met the OWRC objectives of 15 ppm for BOD 53% of the time, and for SS 32% of the time. It is hoped that this will be improved when plant loading stabilizes and when interference from industrial wastes is eliminated. A total of 1425.77 tons BOD and 1202.89 tons SS was removed during the year.

The primary effluent had an average strength of 178 ppm BOD and 102 ppm SS representing removals of 32.8% and 54.8% respectively in the primary section of the plant.

The above results are based on 8- and 16-hour composite samples taken at least twice a week.

A total of 4152 cu. ft. of grit was removed. This represents a grit removal of 3.6 cu. ft. per million gallons of raw sewage which is higher than average. The high grit removal rate during the spring results from runoff of street sand and mud through combined sewers. The high values of August, September and October are a result of the intensified food processing operations, and the "grit" is mostly organic such as tomato seeds and beans.


AERATION TANK PERFORMANCE
122
12 556
100
90
80
70
60
50
40
30
20
10
0
LBS. BOD/100 LBS. MLSS.
CU. FT. AIR/LBS. B.O.D. REMOVED X 100
AERATION X 100
LBS. BOD TO
MLSS. PPM X 100
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 66
19 67
19 ____
19 ____
19 ____

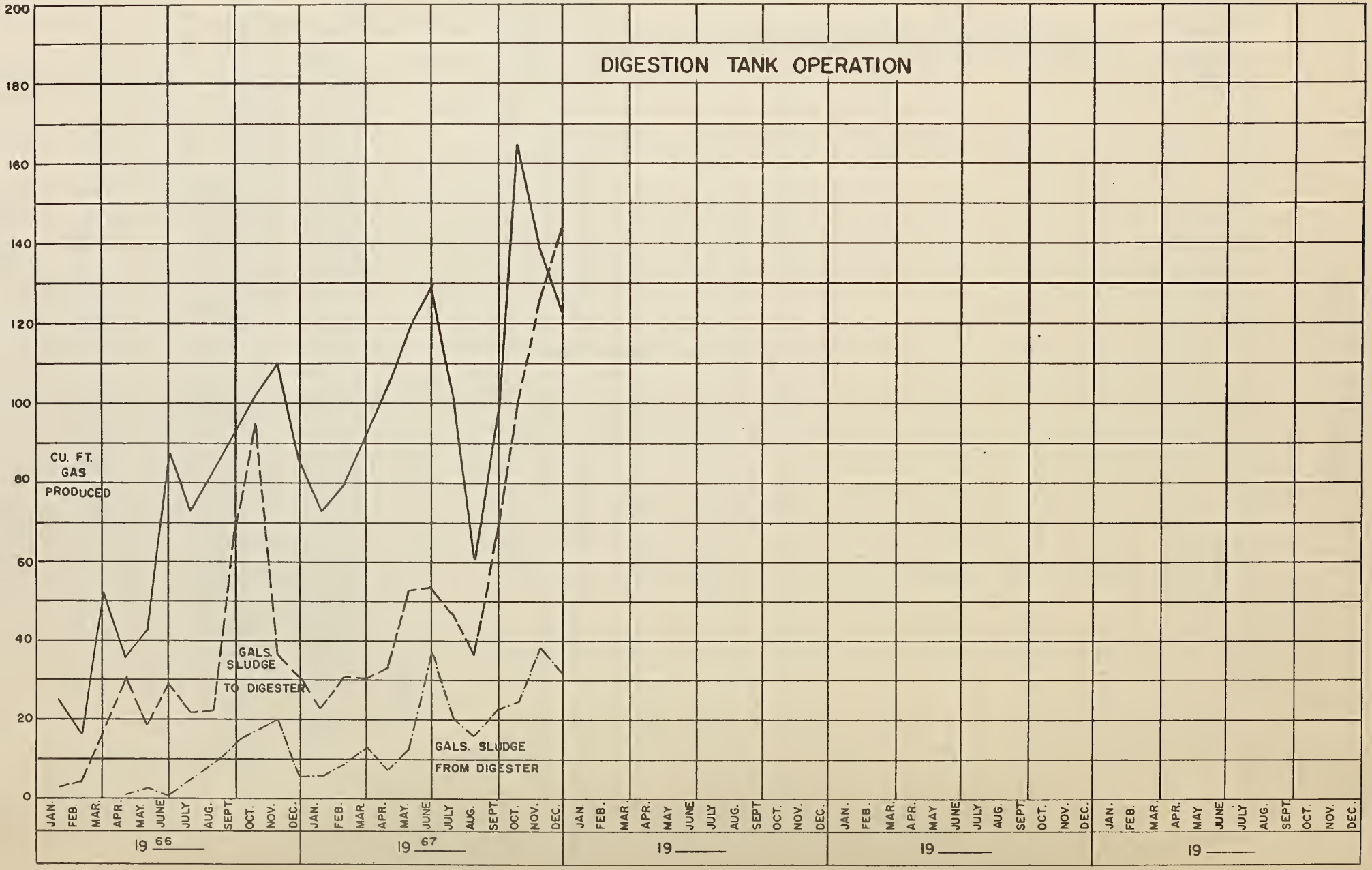
AERATION SECTION

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	79	802	16	4277
FEBRUARY	150	863	27	1489
MARCH	145	716	40	985
APRIL	203	740	55	616
MAY	186	1064	24	1476
JUNE	245	998	63	1000
JULY	150	1153	53	1674
AUGUST	118	984	36	1961
SEPTEMBER	126	845	42	1406
OCTOBER	344	1221	72	1511
NOVEMBER	200	1969	27	1390
DECEMBER	188	2346	24	1373
TOTAL	-	-	-	-
AVERAGE	178	1142	40	1597

COMMENTS

The average BOD to the aeration section was 178 ppm and the average MLSS was 1142 ppm, resulting in an average loading of 40 pounds of BOD per 100 lbs. of MLSS. An average of 1597 cubic feet of air was supplied per pound of BOD removed.

The introduction of wastes from the C and D Sugar Company during the last three months of the year substantially increased the BOD loading on the plant, especially during weekends, and resulted in a higher MLSS concentration in the aeration tank. The net result was generally better treatment for this period.


DIGESTION TANK OPERATION
200
180
160
140
120
100
80
60
40
20
0
CU. FT. GAS PRODUCED
GALS. SLUDGE TO DIGESTER
GALS. SLUDGE FROM DIGESTER
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 66
19 67
19
19
19

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	GALLONS	% SOLIDS	% VOL. MAT.	GALLONS	% SOLIDS	% VOL. MAT	
JAN	235402	4.9	30	62000	5.4	22	726.640
FEB.	303574	5.2	25	98000	6.3	25	804.600
MAR.	308392	5.0	55	130000	5.5	42	924.600
APR.	338376	6.7	48	78000	5.5	42	1047.700
MAY	534584	6.6	48	134900	6.7	41	1199.400
JUNE	540446	6.1	57	371020	4.8	40	1289.200
JULY	477794	6.2	48	214470	8.8	35	1045.300
AUG.	376572	5.9	44	186415	9.5	31	612.766
SEPT.	671895	4.5	54	233595	6.4	37	957.540
OCT.	1006893	5.2	55	257265	4.9	41	1650.500
NOV.	1272324	4.2	61	383515	4.3	43	1402.200
DEC.	1450997	5.4	48	317480	3.5	47	1244.000
TOTAL	7517249	-	-	2466660	-	-	-
AVG.	626437	5.5	48	205555	6.0	37	1075.370

COMMENTS

A total of 7,517,249 gallons of raw sludge was pumped to the digesters and a total of 2,466,660 gallons of digested sludge was removed. The digested sludge removed was equivalent to 344 cubic feet per million gallons of raw sewage.

Most of the digested sludge was disposed of by tank truck. Due to construction of the aerated lagoons, a suitable dumping area on the plant property was not available.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	71.60	4107	5.73
FEBRUARY	63.10	3095	4.90
MARCH	88.65	3490	3.94
APRIL	85.60	*3180	3.71
MAY	77.70	6750	8.69
JUNE	82.00	6730	8.21
JULY	92.10	9930	10.78
AUGUST	106.50	9823	9.22
SEPTEMBER	122.30	7705	6.30
OCTOBER	113.40	6250	2.86
NOVEMBER	114.00	2885	2.53
DECEMBER	133.20	2770	2.08
TOTAL	1150.15	66715	-
AVERAGE	95.84	5560	5.74

* 29 days' chlorination

COMMENTS

The final effluent was chlorinated throughout the year. An average of 5560 pounds of chlorine gas was required each month at an average dosage of 5.74 ppm. A considerable variation in the dosage rate was required to maintain the chlorine residual at the desired level of 0.5 ppm in the effluent for discharge to the Thames River. The highest dosage was required during the late spring and summer months.

CONCLUSIONS

The preceding data present the operating results for the second full year of operation at the Chatham plant. Many operating problems were uncovered, and solved.

The average flow was 3.15 million gallons per day, however, flows were over the design flow of 4.5 mgd on several occasions by the end of the year. These flows do not represent storm flows, a high proportion of which are by-passed directly to the river.

Industrial wastes have created several problems at the project. Odours have been blamed on bean wastes, and some plating wastes of variable pH have killed the activated sludge on several occasions. The tomato pack was handled easily for the second time by the plant, although an aerated lagoon is being constructed for treatment of these wastes in 1968. The aerated lagoons will provide more flexibility in handling flows over plant design.

RECOMMENDATIONS

It is recommended continued emphasis be placed
dustrial wastes by enforcement of the industrial w
is done, there will continue to be many problems i
plant, as well as continued pollution of the Thames


ONTARIO WATER RESOURCES COMMISSION